

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 25F060
STATION NAME: Mill Creek
WATER YEAR: 2014
AUTHOR: Casey Clishe

Introduction

Watershed Description

Mill Creek is one of three watersheds in the Lower Columbia River Intensively Monitored Watersheds project complex. Over 95% of the underlying lithology is of volcanic origin, consisting primarily of flow basalts with interbedded sandstone. The basin is rain dominated with an average annual precipitation rate of 63 inches. Focal species within the drainage include coho, chinook, chum, steelhead, and cutthroat. Land cover is 94% forested. The Department of Natural Resources manages 68% of the forested lands and private landowners manage 32%. Road density estimates in the complex range from 4.2 to 5.8 miles per square mile.

Gage Location

The monitoring station on Mill Creek is located at the Mill Creek Road bridge approximately 0.3 miles upstream from the confluence with the Columbia River.

Table 1. Basin Area and Legal Description

Drainage Area (square miles)	30.5
Latitude (degrees, minutes, seconds)	46 11 26 N
Longitude (degrees, minutes, seconds)	123 10 43 W

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	107
Median Annual Discharge (cfs)	87
Maximum Daily Mean Discharge (cfs)	525
Minimum Daily Mean Discharge (cfs)	12
Maximum Instantaneous Discharge (cfs)	688
Minimum Instantaneous Discharge (cfs)	11
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	240
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	14
Number of Days Discharge is Greater Than Range of Ratings	0
Number of Days Discharge is Less Than Range of Ratings	0
Number of Un-Reported Days	0
Number of Days Qualified as Estimates	75
Number of Modeled Days	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Table 2 Discussion (Discharge Statistics)

Water year 2014 was similar to water year 2013 in that the discharge record was not impacted by backwater effects from the Columbia River. Zero days were excluded from the discharge statistics due to rating curve exceedances. Water year 2014 was another moderate year in terms of discharge with no large storm events. The largest event of the year peaked in very early December. A relatively steady decline to baseflow conditions began in late April. What appears to be a diel evapotranspiration signal in discharge expressed itself from June until the third week in September, when two small precipitation events elevated discharge above baseflow.

Table 3. Error Analysis Summary.

Potential Logger Drift Error (% of discharge)	12.3
Potential Weighted Rating Error (% of discharge)	11.1
Total Potential Error (% of discharge)	23.4

Table 3 Discussion (Error Analysis)

The total potential error (TPE) for water year 2014 is less than water year 2013. Total Potential Error (TPE) is the sum of the logger drift error and the weighted rating error. The logger drift error is associated with the difference between the observed value of the primary gage index and the paired stage value logged within the continuous record. The weighted rating error is associated with the quality of discrete discharge measurements used to develop rating curves. The TPE is consistently applied as a range of predicted discharge throughout the hydrograph for the entire water year. For example, if the predicted discharge for WY2014 at Mill creek is 100 cfs, the range of predicted flows incorporating the TPE is 123 to 76.6 cfs. If the predicted flow is 10 cfs, the range of predicted flows incorporating the TPE is 12.3 to 7.7 cfs.

Table 4. Stage Record Summary

Minimum Recorded Stage (feet)	1.67
Maximum Recorded Stage (feet)	4.60
Range of Recorded Stage (feet)	2.93

Table 4 Discussion (Stage Record)

The stage record at Mill Creek for water year 2014 is continuous and complete. The unusually large and somewhat random discrepancies between the primary gage index observations and comparative stage values were not as severe this water year. This may have been due to the very moderate hydrograph during the water year. These discrepancies between the primary gage index and the logged stage value were resolved using the data shift function. The periods when the discrepancies were unusually large resulted in exceedances of the logger drift error thresholds. These periods were quality coded accordingly in the stage record.

Table 5. Rating Table Summary

Rating Table No.	402	301	403
Period of Ratings	10/01-10/05	10/01-12/01	12/01-09/30
Range of Ratings (cfs)	4.4-994	7.0-994	4.4-994
No. of Defining Measurements	35	22	35
Rating Error (%)	11.2	10.6	11.2

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Table 5 Discussion (Rating Tables)

Aside from a two month period in October and November, replicas of robust rating table 4 (tables 402 and 403), predicted discharge for water year 2014 when coupled to the continuous stage record. The shifts between replicas of rating tables 3 and 4 are due to slight scouring and then filling of the control structure at Mill Creek.

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	
Range of Modeled Stage (feet)	
Range of Modeled Discharge (cfs)	
Valid Period for Model	
Model Confidence	

Table 6 Discussion (Modeled Data)

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Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date

Table 7 Discussion (Surveys)

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Activities Completed

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Appendix